

**Commonwealth of Kentucky  
Division for Air Quality**

***PERMIT STATEMENT OF BASIS***

SYNTHETIC MINOR PERMIT NO. VF-04-001  
CATLETTSBURG REFINING, L.L.C.  
CATLETTSBURG, KY  
DECEMBER 22, 2004  
SREENIVAS KESARAJU, P.E. REVIEWER  
PLANT I.D. # 021-019-00004  
APPLICATION LOG # 56367

## **I. DESCRIPTION OF THE PROPOSED MODIFICATION**

The site of the proposed project is the petroleum refinery operated by Catlettsburg Refining, LLC, a subsidiary of Marathon Ashland Petroleum LLC. This refinery is located on the Big Sandy River in Catlettsburg, Boyd County, Kentucky.

The Kerosene Desulfurizer (KDS) project involves installation of a new KDS Unit (Unit No. 2-122). This unit will have a nominal capacity of 25,000 barrels per day and will utilize a fixed-bed hydrotreating process to process blended kerosene down to a maximum product sulfur content of 10 parts per million (ppm).

On-site construction activities relating to the KDS project will begin in January 2005 and unit startup is scheduled to occur in April 2006.

### **PUBLIC AND U.S. EPA REVIEW:**

Public notice was placed in The Independent on November 3, 2004. The comment period ended on December 3, 2004. There were no comments from the public. The proposed permit will be sent to U.S. EPA review and the comment period will end 45 days after the receipt.

## **II. EMISSION ANALYSIS**

### **A. Information Given and Assumed**

All information used in making this determination was derived from the permit application and supplemental information provided by Catlettsburg Refining, LLC.

### **B. Emission Summaries and Calculation Methods**

As shown in Table 1, the emissions increase calculations include both new emission units and other affected units. Specifically, the calculations include the maximum potential emissions from the new emissions units (i.e., the KDS Charge Heater; equipment in VOC service in the KDS Unit; and equipment in VOC service outside the KDS Unit) and the incrementally increased emissions from other affected equipment, comprising the steam boilers, kerosene product tanks, and KDS Unit feed tanks.

As shown in Tables 1 and 2, for all PSD/NSR regulated pollutants, the project emissions increases are less than the corresponding PSD/NSR significant levels, so no netting was required. Thus, the PSD regulations codified at 401 KAR 51:017 and the major nonattainment area NSR regulations codified at 401 KAR 51:052 are not applicable.

**TABLE 1. SUMMARY OF KDS PROJECT EMISSIONS INCREASES**

| Unit #                                  | Affected Units        | emissions changes (tons/yr) |      |      |       |      | comments  |
|---|-----------------------|-----------------------------|------|------|-------|------|---|
|   |                       | SO2                         | NOx  | VOC  | CO    | PM10 |   |
| 2-122                                   | KDS Unit              |                             |      | 19.3 |       |      | Fugitive VOC from equipment leaks. See Table 2 for details.   |
| 2-122-B-1                               | KDS Charge Heater     | 6.3                         | 11.7 | 1.3  | 19.6  | 1.8  | PTE of new heater based on heat input capacity of 53.3 MMBtu/hr (HHV), NOx emission factor of 0.050 lb/MMBtu (HHV), based on vendor guarantee; SO <sub>2</sub> emission factor of 0.027 lb/MMBtu (HHV), based on allowable fuel gas hydrogen sulfide content; and emission factors of 0.0055 lb/MMBtu (HHV) for VOC, 0.084 lb/MMBtu (HHV) for CO, and 0.0076 lb/MMBtu (HHV) for PM10, all based on AP-42 Section 1.4. |
| Tank 885                                | Kerosene Product Tank |                             |      | 0.5  |       |      | VOC emissions from increased kerosene throughput, using calculations based on AP-42 Section 7.1.  |
| Tanks 886 & 887                         | KDS Feed Tanks        |                             |      | 0.4  |       |      |   |
| n/a                                     | Steam Boilers         | 2.0                         | 20.7 | 0.4  | 6.2   | 0.6  | Increased emissions due to incremental boiler heat input increase of 16.9 MMBtu/hr (HHV) in order to satisfy KDS steam demand.  |
| Total Project Increases                 |                       | 8.3                         | 32.4 | 21.9 | 25.8  | 2.3  |   |
| significant level                       |                       | 40.0                        | 40.0 | 40.0 | 100.0 | 15.0 |   |
| project significant / requires netting? |                       | no                          | no   | no   | no    | no   |   |

**TABLE 2. VOC EMISSIONS DUE TO EQUIPMENT LEAKS**

|                            |                               | light liquid<br>valve | heavy liquid<br>valve | gas/vapor<br>valve | light liquid<br>pump | heavy liquid<br>pump | compressor | PRV      | connector | drains | subtotals |
|----------------------------|-------------------------------|-----------------------|-----------------------|--------------------|----------------------|----------------------|------------|----------|-----------|--------|-----------|
| fugitive<br>(lb/hr/source) |                               | 2.40E-02              | 5.07E-04              | 5.91E-02           | 2.51E-01             | 4.63E-02             | 1.40E+00   | 3.53E-01 | 5.51E-04  | 0.06   |           |
| KDS Unit                   | added                         | 191                   | 558                   | 708                | 2                    | 4                    | 4          | 39       | 1052      | 34     |           |
|                            | emission change               | 20.10                 | 1.24                  | 183.22             | 2.20                 | 0.81                 | 24.57      | 60.25    | 2.54      | 9.55   |           |
|                            | HON control<br>efficiency     | 95%                   |                       | 96%                | 88%                  |                      | 95%        | 95%      | 0%        | 95%    |           |
|                            | controlled emission<br>change | 1.01                  | 1.24                  | 7.33               | 0.26                 | 0.81                 | 1.23       | 3.01     | 2.54      | 0.48   | 17.91     |
| Other Units                | added                         | 1                     | 125                   | 9                  |                      | 2                    |            | 4        | 126       |        |           |
|                            | emission change               | 0.11                  | 0.28                  | 2.33               | 0.00                 | 0.41                 | 0.00       | 6.18     | 0.30      | 0.00   |           |
|                            | NSPS control<br>efficiency    | 76%                   |                       | 88%                | 68%                  |                      | 95%        | 95%      | 0%        | 95%    |           |
|                            | controlled emission<br>change | 0.01                  | 0.28                  | 0.09               | 0.00                 | 0.41                 | 0.00       | 0.31     | 0.30      | 0.00   | 1.39      |

1. Due to rounding, figures may not add to totals shown.

2. Emission factors, except for process drains, are from *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017), U.S. EPA, November 1995, "Table 2-2: Refinery Average Emission Factors." The emission factor for process drains is based on AP-42 Section 5.1, Table 5.1-3 (January 1995 Ed.).

3. Control efficiencies, except for compressors, PRV's, and process drains, are from *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017), U.S. EPA, November 1995, "Table G-2: Determination of LDAR Control Effectiveness at Refinery Process Units." Efficiencies for Light Liquid Valves, Gas/Vapor Valves, and Light Liquid Pumps inside the KDS battery limits are those specified for the "HON REG NEG" control program. Other efficiencies are as specified for "Monthly" control program. Efficiencies for compressors, PRV's, and drains are based on conservative engineering assumptions due to the use of refinery flares for compressor seal emissions and carbon canisters for process drains.

### **III. REGULATORY APPLICABILITY**

#### **A. PSD**

The Kentucky PSD program, 401 KAR 51:017, applies to construction of a major source or major modification in an area that is not designated nonattainment for the pollutant in question. This program meets the federal PSD program requirements set forth at 40 CFR 51.166, as required by part c, Title I of the Clean Air Act. The area in which the Catlettsburg refinery is located (in Boyd County), is either undesignated or is designated attainment for all pollutants other than ozone and SO<sub>2</sub>.

Applicability of the PSD regulations is not triggered for the KDS Project because no significant net emissions increase will result. The net emissions increases for all PSD-regulated pollutants, and the corresponding “significant” levels, are shown in Table 1 in the previous section.

#### **B. Nonattainment NSR**

The Kentucky nonattainment NSR program, 401 KAR 51:052, applies to construction of a major source or major modification in an area that is designated nonattainment for the pollutant in question. This program meets the federal nonattainment NSR program requirements set forth at 40 CFR 51.165, as required by part d, Title I of the Clean Air Act. The area in which the Catlettsburg refinery is located (in Boyd County), is designated nonattainment for ozone and SO<sub>2</sub>.

Applicability of the nonattainment NSR regulations is not triggered for the KDS Project, with respect to ozone and SO<sub>2</sub>, because no significant net emissions increase of VOC, NO<sub>x</sub>, or SO<sub>2</sub> will result. The net emissions increase and the corresponding “significant” level for these pollutants are shown in Table 1 in the previous section.

#### **C. NSPS**

Federal New Source Performance Standards (NSPS) are required under section 111 of the Federal Clean Air Act and are codified at 40 CFR part 60. Several NSPS regulations are potentially applicable to emissions units that are affected by the KDS Project.

The NSPS for Petroleum Refineries, 40 CFR 60 subpart J, is applicable to the new KDS Charge Heater. The requirements of this rule are included in the permit.

The NSPS for Equipment Leaks of VOC in Petroleum Refineries, 40 CFR 60 subpart GGG, is applicable to equipment in VOC service in the new KDS. The requirements of this rule are not included in the permit because they are superseded by 40 CFR 63 subpart CC.

The NSPS for VOC Emissions from Petroleum Refinery Wastewater Systems, 40 CFR 60 subpart QQQ, will apply to the new drain system associated with the KDS Unit (ID No. 2-122). Rule requirements are included in the permit.

#### D. PRE-1990 NESHAP

National Emission Standards for Hazardous Air Pollutants (NESHAP) promulgated prior to the Clean Air Act Amendments of 1990 were established as risk-based standards (post-1990 NESHAP are technology-based standards).

The NESHAP for Benzene Waste Operations, 40 CFR 61 subpart FF, is applicable to all petroleum refineries, including the Catlettsburg refinery. The KDS Project will not impact the manner or extent to which this regulation applies to the refinery.

#### E. MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY

NESHAP standards promulgated subsequent to the Clean Air Act Amendments of 1990, as required by § 112(d) of the Act, are generally referred to as Maximum Achievable Control Technology (MACT) standards. These standards apply to major sources of HAP, including the Catlettsburg refinery.

The Catlettsburg refinery is subject to the MACT standard for Petroleum Refineries, 40 CFR 63 subpart CC. This regulation includes emission standards for miscellaneous process vents, storage vessels, wastewater, equipment leaks, gasoline loading racks, and marine vessel tank loading operations. The Catlettsburg refinery is an existing source and is subject to the emission standards for existing sources in each of these emissions unit subcategories. The proposed KDS project will have little impact on the manner and extent to which subpart CC is applicable. In particular, it is worth noting that all process units at the Catlettsburg refinery will continue to be regulated both collectively and as an existing affected source.

40 CFR 63 Subpart CC provides two compliance options for affected process units: 40 CFR 60 Subpart VV and 40 CFR 63 Subpart H. Equipment in the KDS Unit (No. 2-122) will be subject to the 40 CFR Part 63 Subpart H compliance option (as referenced by 40 CFR 63.648(c)).

All petroleum refinery valves, pumps, compressors, and sample stations associated with this process unit, and determined to be in VOC service, are presumed to be in organic hazardous air pollutant (OHAP) service and therefore subject to 40 CFR Part 63 Subpart H (40 CFR 63.648(a)(1)). For purposes of 40 CFR 63.648(a)(2), calculation of leaking components is performed on a process unit basis.

For purposes of 40 CFR 63 Subpart CC, a list shall be maintained of all affected process vents, as defined in 40 CFR 63.641, and their associated control devices. Certain relief valves are not process vents because (1) their operation is critical to the safe operation of the process units and (2) their emissions occur only intermittently. The process vents are exempt from any of the emission standards of 40 CFR 63 Subpart CC because they are vented to one of the control options under this subpart. Further, the emissions from process vents are not considered fuel gas and therefore are not subject to the provisions of 40 CFR 60 Subpart J. The control devices shall be maintained and operated in accordance with the provisions of 40 CFR 63 Subpart CC. Upset and blanket gases are routed to the flare system, which is compliant with the 40 CFR 63

Subpart CC provisions.

Pursuant to 40 CFR 63.642(k)(2), the Permittee is not required to calculate the annual emission rate specified in 40 CFR 63.642(g).

Pursuant to 40 CFR 63.640(p), equipment leaks that are also subject to the provisions of 40 CFR parts 60 and 61 are required to comply only with the provisions specified in 40 CFR 63 Subpart CC.

The only new process unit, the KDS Unit (ID No. 2-122), will not have the potential to emit 10 tons per year of any HAP or 25 tons per year of HAPs in total. Thus, under §63.640(i), the KDS Unit is treated as a part of the existing affected source.

The Catlettsburg refinery also is subject to the MACT standard for petroleum refinery catalytic cracking units, catalytic reforming units, and sulfur plants, codified at 40 CFR 63 subpart UUU. The proposed KDS project will have no impact on the manner and extent to which subpart UUU is applicable. In particular, it is worth noting that all process units at the Catlettsburg refinery will continue to be regulated, collectively, as an existing affected source under subpart UUU.

#### F. KENTUCKY NEW SOURCE STANDARDS

Several of the emission standards set forth at 401 KAR Chapter 59 are applicable to the Catlettsburg refinery and to the KDS Project. These include the following:

401 KAR 59:015, “New indirect heat exchangers,” is applicable to the new KDS Charge Heaters. The requirements of this rule are included in the permit.

401 KAR 59:046, “Selected new petroleum refining processes and equipment,” is applicable to process unit turnarounds and to vacuum-producing systems throughout the refinery. The requirements of this rule are included in the permit.

401 KAR 59:105, New Process Gas Streams is not applicable to the charge heater as Catlettsburg refinery is complying with 401 KAR 59:015.

#### **CREDIBLE EVIDENCE:**

This permit contains provisions that require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.